

Applicant: Rudko *et al.*  
For: ENDOVASCULAR TISSUE REMOVAL DEVICE

1           1.       An endovascular tissue removal device comprising:  
2                   a lumen including a distal steerable tip portion extending from a joint  
3       portion;  
4                   registration means for holding the joint portion fixed in place in the  
5       vasculature; and  
6                   a source of ablation energy in communication with the lumen whereby  
7       tissue can be resected by ablation energy as the tip portion is steered within the  
8       vasculature.

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1           2.       The device of claim 1 in which the registration means includes an  
2       inflatable balloon about the joint portion.

1           3.       The device of claim 1 in which the source of ablation energy is a laser.

1           4.       The device of claim 3 in which the distal steerable tip portion includes a  
2       deflectable tip catheter.

1           5.       The device of claim 4 in which there is an optical fiber inside the  
2       deflectable tip catheter and connected to the laser.

1           6.     The device of claim 1 further including an expandable barrier for trapping  
2     any debris resected.

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1           7.     The device of claim 1 further including an expandable mechanism  
2     inflatable on the ventricular side of the valve for supporting the leaflets of the valve.

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1           8.     The device of claim 7 further including an absorptive surface on the  
2     expandable mechanism for absorbing ablation energy.

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1           9.     The device of claim 7 in which the expandable mechanism is a balloon.

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1                   10.     An endovascular tissue removal device comprising:  
2                             a lumen including a distal steerable tip portion extending from a joint  
3     portion;  
4                             an inflatable balloon about the joint portion for registering the joint portion  
5     fixed in place in vasculature; and  
6                             a source of ablation energy in communication with the lumen whereby  
7     tissue can be resected by ablation energy as the tip portion is steered within the  
8     vasculature.

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1                    11.     An endovascular tissue removal device comprising:  
2                    a lumen including a distal steerable tip portion extending from a joint  
3     portion;  
4                    registration means for holding the joint portion fixed in place in  
5     vasculature; and  
6                    an optical fiber within the lumen and steerable by the distal steerable tip  
7     portion and connected to a source of ablation energy to resect tissue as the tip portion is  
8     steered within the vasculature.

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1           12.    An endovascular tissue removal device comprising:  
2                   a lumen including a deflectable tip catheter;  
3                   registration means for holding the catheter fixed in place in vasculature;  
4       and  
5                   a source of ablation energy in communication with the lumen to resect  
6       tissue by ablation energy as the deflectable tip is steered within the vasculature.

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1           13.    An endovascular heart removal device comprising:  
2                   a catheter including a deflectable tip;  
3                   a laser source;  
4                   an optical fiber within the catheter connected to the laser source; and  
5                   an inflatable balloon for registering the deflectable tip in vasculature to  
6    resect a heart valve with laser energy as the deflectable tip portion is used to steer the  
7    distal end of the optical fiber within vasculature.

1           14.    The device of claim 13 further including an expandable barrier for  
2    trapping debris during resection.

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1           15.    An endovascular heart removal device comprising:  
2                   a catheter including a deflectable tip;  
3                   a laser source;  
4                   an optical fiber within the catheter connected to the laser source;  
5                   a first inflatable balloon for registering the deflectable tip in vasculature to  
6    resect a heart valve with laser energy as the deflectable tip portion is used to steer the  
7    distal end of the optical fiber within vasculature; and  
8                   a second balloon inflatable on the ventricular side of the valve for  
9    supporting the leaflets of the valve.

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2                   16.     A method of resecting a valve, the method comprising:  
3                             endovascularly introducing a lumen with a distal steerable tip portion to a  
4     position proximate a valve to be resected;  
5                             registering the lumen in place in the vasculature;  
6                             directing ablation energy through the lumen; and  
7                             steering the distal steerable tip portion to resect the valve.

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1                   17.     The method of claim 16 further including the step of endovascularly  
2     introducing an expandable mechanism on the ventricular side of the valve and inflating  
3     the expandable mechanism to support the leaflets of the valve during resection.

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1                   18.     A method of resecting a valve, the method comprising:  
2                             endovascularly introducing a lumen with a distal steerable tip portion to a  
3     position proximate a valve to be resected;  
4                             registering the lumen in place in the vasculature;  
5                             endovascularly introducing an expandable mechanism on the ventricular  
6     side of the valve and inflating the expandable mechanism to support the leaflets of the  
7     valve during resection;  
8                             directing ablation energy through the lumen; and  
9                             steering the distal steerable tip portion to resect the valve.

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